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FINNISH SAILING DIRECTIONS FOR PETSAMO

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OF  
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S U M M A R Y   O F   C O N T E N T S

Finnish Sailing Directions for Petsamo  
(WDC No 548)

This document contains sailing directions for the Petsamo area as prepared in 1940 on the basis of information compiled by the Finnish Sea Chart Office in 1937 - 1938. In three sections, it presents a general summary of navigational information, a general description of the area, stressing depths and elevations, and detailed descriptions of important landmarks. Thirty-six thumbnail-type illustrations in the original manuscript have been omitted from this translation because they lacked sufficient clarity for reproduction.

Pages 1 through 26

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COMPLETE TRANSLATIONFINNISH SAILING DIRECTIONS FOR PETSAMO

CPYRGHT

1940

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- A. General Information
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A. General Information

1. Sea chart Finnish sea chart No 200 (scale 1:60,000) includes the Petsamo area (Vuoremi-Liimahamari-Vaia Bay). This area extends northward to latitude  $70^{\circ} 05'$ , southward to the head of Petsamo Gulf, westward to longitude  $30^{\circ} 42' E$  and eastward to longitude  $32^{\circ} 05' E$ .

2. Reliability of the chart The chart of the Petsamo area is based on surveys made in 1937 - 1938. Soundings were made with echo sounding depth devices. Special examinations were made of most of the shoals, banks, etc. The depths appearing on the chart are therefore accurate. Since this chart is drawn to such a small scale it was necessary to omit information regarding some of the more unimportant places. Mariners must therefore be very careful when entering some bays, coves, etc. unless well acquainted with that area.

Depths are given in meters corrected according to a plane of reference which is 220 centimeters below mean low water. Therefore, under normal conditions, the depth at a certain point is never lower than that shown on the chart. The depth curves traced on the chart delimit the respective water areas with a high degree of accuracy.

The Petsamo area was charted by the Finnish Geodetic Survey in the years 1925 - 1928. The coast line was drawn as it appears at mean low water. Parts of low coast regions which dry at low tide are also shown on the chart. Drying areas are indicated by dots. The chart also shows the height above sea

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level of the most important elevations in meters at mean low water. The charting is accurate to facilitate the use of summits, capes and other landmarks to take bearings.

The year in which the chart was issued is always shown below its title. All changes in Finnish charts affecting lights, marks, new depths, etc. and other matters of importance to mariners are published in the Notices to Mariners prepared by the Finnish Hydrographic Office. These notices are published on the 10th, 20th, and last day of each month. The office always corrects charts according to the latest notice. The date of the latest information or change is stamped on every chart sold.

3. Magnetic variations According to Russian and Norwegian surveys, the magnetic variation at Petsamo was 7° 24' in 1938 and increases 8' annually.

4. Lights The Finnish Hydrographic Office publishes a list of lights every three years containing accurate information regarding the lights, such as their power, periods, etc. These lists can be procured from local agencies. A supplementary list is also published annually showing the changes to the lights during the year. All lights in the Petsamo area are extinguished from April 15th to August 1st.

5. Tides The Finnish Geodetic Survey publishes annually, in advance, a tide table for Liinahamari giving for every day in the year the time of the tides and high and low water based on the mean low water level. The depth of the water at any place at the time of high and low water can be determined by merely adding 220 centimeters to the depth given in the table. These tables can be purchased from the Finnish Geodetic Survey or the cooperative store at Liinahamari.

No comprehensive survey has been made of the tidal currents in the Petsamo area. But it has been observed that the current has a velocity of 1 1/2 knots along the coast. The velocity is greater in narrow coves, etc.

6. Ice No ice forms seaward nor in most of the bays, coves, etc. There is no frost except in places at the heads of the bays, etc. Ice usually occurs in Petsamo Gulf and Veneniemi Bay from December to April under normal winter conditions. The ice melts in spring and some of it drifts out to sea in small cakes with the tidal current. No other types of drift ice occur in the Petsamo area.

7. Climate The Petsamo area naturally has highly variable weather. Winds, fog and rain occur with great suddenness, but are usually of short duration. East winds prevail in summer. Thick fogs are common from the middle of May to early July, especially seaward, although they frequently enter the bays, coves, etc. These fogs are frequently local. Sometimes the bays are foggy while it is clear out to sea, or vice versa. The fog limits are always clearly defined.



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Mirage occurs frequently in this area on clear summer days, especially in the morning and afternoon. The appearance of the landscape is altered considerably by mirage. These changes sometimes occur very rapidly. The presence of mirage is indicated by undulating lines on the horizon.

The winds are variable in the fall, and changes in the weather are frequent. Southwest winds prevail in winter, and there are many storms. January is usually the stormiest month. The following table shows weather conditions in this area in the summer of 1937:

Weather conditions

Month	Clear days	Cloudy days	Rainy days	Snow	Foggy days	Hazy days	Total
June	8	11	2	2	2	5	30
July	9	9	1	.	3	9	31
August	5	6	3		3	14	31
Totals	22	26	6	2	8	28	92

Winds

Month	North	East	South	West	Calm	1-3 B	4-6 B	7-8 B
June	2	9	7	6	6	12	11	1
July	3	21	1	2	4	25	2	
August	6	9	6	6	4	22	5	
Totals	11	39	14	14	14	59	18	1

The weather in the summer of 1937 was unusually fine and dry and should not be taken as a criterion for all summers in that area. Only two storms of brief duration occurred during the entire summer. One of them on the afternoon of June 26th came from the north with a force of Nine B, and the other on the afternoon of June 28th, from the west with a force of Nine B.

The number of hazy days depends mostly on peat fires, which, in dry summers, usually burn both on the shore and farther inland. The haze is usually light and does not interfere seriously with visibility. The haze is dense only when a cold wind blows.

8. Sunlight All of the Petsamo area is located north of the Arctic Circle, and the number of days of sunlight therefore varies, dependent on the seasons of the year.

The polar day, when the sun never sets, begins on May 26th and ends on July 18th. The midnight sun closely resembles a setting sun. Its light is weaker than at noon and is slightly reddish due to the damper air at night. Atmospheric humidity and the reddish light of the sun give the landscape a purple color at night.

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In August there is less light at night, and stars are visible at the end of the month. The long twilight ends about September 15th, and it is dark as soon as the sun sets. The cloudy weather prevalent in the fall is partly responsible for the sudden darkness.

The polar night, when the sun never shines, lasts from November 22d to January 1st. Lights are needed at all hours of the day, except on unusually clear days when it is possible to read without lights for about two hours at noon and to see objects outdoors for about four hours.

The days become brighter in February, but very slowly at first. It is still dark between 2200 and 0200 hours in the latter part of April, and the shore cannot be clearly seen from a great distance out to sea.

Northern lights are seen frequently from September to March. They are either white or colored. The white lights are less changeable. The colored lights change very rapidly. Northern lights appear at night and last for as long as fifteen hours.

9. Pilots The Petsamo area has not pilot service. The harbormaster at Liinahamari directs piloting in this area.

10. Customs The petsamo custom house is located at Liinahamari. All vessels are cleared there. Its hours are 0900 to 1700.

11. Patrol service The motor ship TURJA, stationed at Petsamo, patrols this area. Border-patrol stations have also been located on the shore of Vaida Bay, Pummanki and Maattivuono. These stations inspect vessels for the custom house, but do not clear them.

12. Lifesaving service The patrol ship TURJA has rocket lifesaving equipment. It operates in the waters of the Petsamo area. This ship has a radio telephone, but there are no regular hours of operation.

#### B. General Description of the Petsamo Area

1. General The coast of this area is mostly low, without islands or sheltered anchorages. The only prominent islands are the Ainovskie Islands, known to the Finns as Heinasaari, Lunnisaari and Laassat. Pechenga Gulf (Petsamonsuono) is the only body of water extending far inland. There are also many other small bays, coves, etc., such as Vaida Bay, known to the Finns as Vaihtolahti, Pummanginsuono, Maattivuono, Pikku-Maattivuono, Suolavuono, Aaresvuono and Lapinmukka. But most of them are exposed to winds from all directions.

The most conspicuous landmarks on the shore are the summits of the highest elevations, especially Kelloviisi on Vaida Bay, Pummanki Hill on the northern extremity of Pummanginiemi (Cape Pummanki) and Passaritunturi on the west side of Peuravuono.

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2. Depths and elevations. The depths in the Petsamo area are generally great. There are only two shoals at some distance seaward, the Hein#saari Shoals. The most northerly has a depth of 11 meters and is located in lat.  $69^{\circ} 55.5' N$ , long  $31^{\circ} 19' E$ ; the most southerly has a depth of 15 meters and is in latitude  $69^{\circ} 55' E$ , long  $31^{\circ} 14' E$ .

The maximum depth of 391 meters is in the eastern part of this area, 6.5 miles north of Vuoremi.

A curve, with depths of 200 to 300 meters, is located in the northern part of Petsamp, north of parallel  $69^{\circ} 58'$ . But these depths are not found in the northern part of Vaida Bay, where they are less than 200 meters everywhere. Two extensions of this curve occur on its north side. The more easterly of these extensions is on the west between Ainovskie Islands (Hein#saari) and Hein#saari Shoals. The 200 - 300 meter curve widens considerably off the northern extremity of the Ainovskie Islands in a westerly direction toward Ruumisniemi, situated east of the entrance to Peuravuono, and in an easterly direction toward the center of Maattivuono. The curve extends toward Ruumisniemi as far as one nautical mile offshore and toward Nurmens#tti within two nautical miles of the shore.

The more westerly of the extensions of the 200 - 300 meter curve is located west of Hein#saari Shoals and extends toward the mouth of the Vuoremi River about one mile from the shore. West of this curve is an area (which widens westward) with depths in excess of 300 meters. Other water areas with depths in excess of 300 meters occur farther north (see chart). Another small area with the same depths is located midway between Peuravuono and Nurmens#tti, about three miles offshore.

A curve with depths of 100 to 200 meters lies between the extensions of the 200 - 300 meter curve at the Hein#saari Shoals. It extends from Aaresvuono to Peuravuono and lies very close to the shore. Elsewhere off the west shore this curve narrows to a width of only about  $1 \frac{1}{4}$  mile. But the west coast of the fishing stations (isles) has lesser depths. The limits of the 100 - 200 meter curve are about two miles from Valasniemi Light and extend far northward to within about  $\frac{1}{4}$  mile from the west shore of the Ainovskie Islands; thence due northeast until, at the parallel of the northern extremity of Vaida Bay, it turns north (See chart). The entire area north of Vaida Bay, therefore, has depths of less than 200 meters.

A curve with depths of less than 100 meters extends from the northern coast of Vuoremi to Nurmens#tti, about  $\frac{3}{4}$  to one mile offshore. Off the west coast of the fishing isles, the limits of this curve are about two miles from Valasniemi, approach within one to  $1 \frac{1}{2}$  miles of Pummanginiemi and then extend to within about  $\frac{1}{4}$  mile from the west shore of the Ainovskie Islands; thence they extend east about three miles from the west and six miles from the northern part of Vaida Bay. Hein#saari Shoals are surrounded by a large area less

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than 100 meters deep. This area is one to two miles wide and 4.4 miles long from southwest to northeast. This water area has two shoals with depths of less than 50 meters lying around the Heinasaari Shoals.

The shore from the mouth of the Vuoremi River to Maattivuono is elevated and has many peaks. The summits of hills located far inland can be clearly seen in some places. The heights of the elevations near the coast are not easily determined, because the adjacent hills always seem to be higher than those standing farther inland. However, the elevations are more clearly seen on approaching within five miles of the coast. The highest peak in the Petsamo area is Pasaritunturi (504 meters) located west of Pearavuono.

The shore is steep and bare. It has a dark gray color. Mountain birch grow in places inside the bays, coves, etc. and along the rivers.

Maattivuono Bay has a conspicuous granitic shore, and its hilly north shore abounds in shapeless schist. There are a few other elevations on the south side, but they cannot be clearly distinguished from the surrounding landscape because of their round shape and the gentle slope of their valleys. On the west shore of Pummanginiemi the slate layers form a steep high cliff rising abruptly from the shore to a height of about 100 feet. This formation is called "Lintupahta" (Bird Cliff). The shore is still lower on the north side of Pummanginvuono, and the extremity of the Vaida Bay peninsula becomes still lower farther northward. The highest elevation on the shore is Pummanki Hill (201 meters) on the south side of Pummanginvuono. Kelloviisi (77 meters) at the cape on the north side of Vaida Bay is the highest elevation in that area.

The fishing isles are treeless except for mountain birch and scrub. The berry bushes and moss which cover the peninsula give it a reddish appearance.

No reliable data exists regarding the gradual rising of the land, but this phenomenon has been observed on the shores of Northern Norway and Russia. It has been estimated to amount to 1.8 meters in a hundred years. But this rate varies considerably in other localities. In some places the rate has been determined by measurement to amount to as much as 3.5 meters in 75 years.

### C. Landmarks

1. Vuoremi The Vuoremi River, which is the boundary between Finland and Norway, flows into the sea approximately in lat.  $69^{\circ} 47' N$ , long.  $30^{\circ} 50' E$ .

Far out to sea this river resembles a gully behind lower coast elevations. On approaching closer, the white sandy coast of Norway with the steep Arctic hills beyond it and Oskar II Chapel with its white sides and black roof can be clearly seen. On the north the chapel is seen in the midst of a sandy shore. Its eastern extremity is visible from the northeast. About two to five nautical miles distant on Finnish soil are several

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other landmarks: Vuoremi Light, on the shore of Kiilanuottaniemi and a conical unpainted boundary stone at Keillaniemi.

The bank of the Vuoremi River on the Norwegian side is a low shifting sandbank. Steep hills (tunturi) rise close behind the sandy shore. The coast on the Finnish side has no rocks.

Many drying reefs, washed by breakers, are situated about 1.2 kilometers west of the mouth of the river. An iron pole has been set up on the seaward side of a reef. There are several shoals north of this pole. One of them is located 300 meters from this pole with a depth of less than six meters; another 500 meters from it with a depth of less than 10 meters; 150 meters east of this pole is a shoal with a depth of less than six meters; and 250 meters from the pole, another shoal with a depth of less than 10 meters. Another pole stands on a bank about 100 meters northwest of Keillaniemi to guide mariners to the river.

a. Directions for approaching Vuoremi Use Oskar II Chapel as a landmark and steer directly toward it from the open sea. In front of Vuoremi is a relatively extensive area with depths of less than 20 meters suitable for anchoring. If it is desired to anchor as close as possible to the shore, it will be useful to remember that the depths everywhere in a line with Vuoremi Light and the outermost pole are over eight meters for a distance of 100 meters and over six meters for a distance of 200 meters landward. The bottom is sand, and the anchorage is always exposed to northwest, north and northwest winds.

Small motor boats generally anchor at the entrance to Keila Bay. The bay is only 80 meters wide at its entrance, and the depth in the middle is five meters. The bottom is rock. Row boats can reach the shore in the upper parts of the bay. This bay is also exposed to north winds. Motor boats can anchor at Lapinmukka, where they are sheltered against north winds.

The mouth of the Vuoremi River is about 20 meters wide and one meter deep. Drying sandbanks which shift constantly are located in front of and along the entire river. Vessels with a draft of 1.5 meters can always move up the river and proceed as far as the village of Vuoremi at the slacks. The location of the banks in the river must be definitely known. The natives rarely enter the river, except to lay up their motorboats for the winter. Row boats can leave the river about 3.5 miles from the shore.

b. Settlements Several small settlements are located on the Finnish banks of the river. The inhabitants speak Russian, and most of them some Finnish. They are engaged in salmon fishing and cattle raising.

Jakobselv, another small village, with a custom house, a border patrol station and telephone connection, is situated on the Norwegian side of the river. It has telephone connection with Finland via Salmijärvi.

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2. Lapinmukka Lapinmukka is located about 1.4 kilometers east of Vuoremi. Its entrance is about 750 meters wide, and the cove extends inland about 1/2 nautical mile in a southeast direction. Lapinsaari Isle, 12 meters high, stands almost in the middle of its entrance and a short distance to the west. Two small rocks stand about 150 meters northwest of this isle. A bank with a depth of 7 to 9 meters is located 200 meters north of these rocks. Another bank with a depth of 3.4 meters is situated 300 meters from Lapinsaari, bearing 15°. Two banks, which dry at low tide, are found at the entrance to the cove about 100 meters from the east coast. Off the southern extremity of Lapinsaari and about 200 meters from the east shore are two other drying banks. Two submerged rocks are also located about 100 meters south of Lapinsaari. These are the only dangers in this cove.

a. Directions for approaching Lapinmukka On approaching from the sea, the best landmarks are Oskar II Chapel, Vuoremi Light and the peak of Pasaritunturi. The bearings of the ship should be taken very carefully, because the entrance to the cove can be distinguished only when close to the shore.

Vessels should be steered by the aid of the leading marks after the bay is entered. Leading marks are erected on the south shore of the cove. The lower mark is a white stone structure 1.5 meters high, standing 12 meters above the water level. The upper mark is a structure of white painted rocks with a red stripe in the middle and standing about 54 meters above water level. They stand in a line in direction 192°, midway between Lapinsaari and the submerged rocks off the east shore. The depths in the channel fluctuate between 8 and 20 meters.

Vessels should be kept exactly in the line of leading marks, because the navigable channel is only about 200 meters wide. After reaching the line, south extremity of Lapinsaari, west point of Lapinmukka, turn aport bearing 130° until Lapinsaari is directly astern. Ships can anchor in depths of 7.5 to 9 meters after following this course for about 100 meters. Motor boats can go still farther into the cove and anchor in depths of 5 to 6 meters, sand bottom.

This anchorage is exposed to north winds, but affords better shelter than the mouth of the Vuoremi River. Swells are also felt in this anchorage. Small ships cannot winter in this cove.

Settlements formerly existed on the shores of this cove, but it is not inhabited now. A small stream with good drinking water flows into the southeast part of the cove.

3. Stolbova Stolbova Bight is located about 1 1/2 nautical miles east of Vuoremi. The bight has elevations on its north side and is sheltered by steep Vaylasaari Isle. Another isle of the same size, called Stolbovansaari, is situated south of Vaylasaari.

Formerly Stolbova Bight was a good anchorage, but it is now so shallow that small ships cannot anchor there. It reaches a maximum depth of 3.4 meters in its northeast part. This depth decreases abruptly toward the shores. The middle of the bight dries at low tide. Ships can be hauled ashore for the winter on the south side.

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Vessels with a maximum draft of one meter can enter the bight either through Ostareka (east entrance) on the east or Västareka (west entrance) on the west. The east entrance is wide, but the submerged part of the rocks slopes so that the channel is narrow and winding. The west entrance is very narrow with steep sides. It has strong whirlpools and very weak swells. Ships can anchor in depths of 20 to 50 meters south of Stolbova Isle. The bottom is clay and rock.

This area is not inhabited.

4. Aaresvuono Aaresvuono is situated about 2.4 nautical miles east of Vuoremi, midway between the latter and Suola-yuono. The bay extends southward for about one mile. Its entrance is 800 meters wide. It is 500 meters wide at its center. Its shores, especially southward, are high and steep and of a dark grey color. The Aares River discharges into the upper part of the bay. Mountain birch grows on the banks of the river. Its water is potable. At the head of the bay is a valley which extends in the same direction between the hills. Aaresniemi is low, but can be sighted from the sea. Ristiniemi, a fairly high elevation, can also be distinguished, because it is paler in color than the surrounding landscape. Valkeaniemi, behind which the terrain rises abruptly toward the Valkeatunturi Mountains, is high and pale in color and can be easily distinguished from the east.

An area with depths of 45 to 50 meters lies in front of the entrance to the bay. East of this water area and 600 meters north of Aaresniemi is a detached shoal with a depth of 20 meters. The depth fronting the bay is 70 meters, which decreases gradually toward the shore and the head. The east coast of the bay is deep everywhere and clear almost up to the shore. About 40 meters from the middle of the west shore is a rock which dries at low tide; 400 meters from the head of the bay and 40 meters off its west shore is another drying rock. The west coast is otherwise clear. The bottom at the entrance is sand and clay. It is sand at the head.

a. Directions for approaching Aaresvuono On approaching Aaresvuono from the sea, it is difficult to distinguish its entrance from a great distance. The bearings of the ships should be taken with the aid of Vuoremi Light, Pummangintunturi or Pasaritunturi. The bay can be approached very closely because of the deep water offshore. When the entrance to the bay is sighted, steer southward until reaching its center. The best anchorage is about 500 meters from the head of the bay at a point near a cliff formed of a mass of broken rocks. It has depths of 30 to 40 meters and the bottom is clay. The vessel must be ready to leave the bay when the wind changes to the north, because the anchorage is not sheltered against winds from that direction. Motor boats can be moved farther inland toward the head of the bay and anchored in a depth of 10 meters.

This anchorage is not suitable because of its

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great depths. It is dangerous to anchor sailing vessels in this bay, because they cannot leave it, if the wind shifts to the north. There are no settlements in this bay.

5. Suolavuono The north coast of Suolavuono is the best and most sheltered anchorage for small vessels. It is too narrow for large vessels. This bay is one nautical mile long in a south-southeast direction. Its width from its entrance to the center is 400 meters. Beyond Santamukka, which is situated in the center of the bay, the width decreases to 250 meters. Its shores are bordered by high, steep, red granite rocks. At the head of the bay is a flat grass-covered plain extending in the same direction as the bay and clearly seen from the sea. A river with good drinking water discharges into the head of the bay. Another river with good water discharges into the bay 300 meters west of Santamukka. A spring is located 100 meters west of Santamukka in the crevice of a rock.

The entrance to the bay has depths of eight to 15 meters; its center, seven to 22 meters; and its narrow south part, 18 meters. At its head the depths are less than 10 meters, with dry patches at low water. Near the middle of the bay, off the northern extremity of Santamukka, is a drying rock which is steep on all sides. At the entrance to the bay, 200 meters north of Ostaniemi, is a drying rock called Akanlaassa. A detached unexplored shoal with a depth of 2.2 meters lies 500 meters eastward. Akanlaassa is steep everywhere, and small fishing boats can navigate between this rock and Ostaniemi from the strait.

a. Directions for approaching Suolavuono Suolavuono is difficult to distinguish from the sea. Bearings can be taken with the aid of Heinysaari Light and Passaritunturi or Peuravuono. From the northwest, Passaritunturi seems to be close to the head of the bay, and Suolatunturi is a short distance away on the starboard side. The white pebbly shore east of Valkeaniemi, which extends close to the entrance of the bay, can be seen far out to sea. Both Ostaniemi and Vastaniemi can be clearly seen against the high elevations. From the north, the mouth of a river about 500 meters west of the entrance to the bay and the steep gully through which it flows southward are easily seen. However, when seen from the sea from the southeast, the valley at the head of the bay seems to be level and wider. The gully is also visible on the south.

When the mouth of the bay has been distinguished, steer toward Vastaniemi, its west cape, to pass Akanlaassa. There is a steep cliff on the shore near Vastaniemi. Ostaniemi is lower and has a leading mark at its extremity pointing east to guide vessels. It can be seen from a distance of one to two kilometers. On reaching the entrance, approach the east shore closely and continue toward it until clear of the submerged rock north of Santamukka. A course may also be shaped along the west shore, but there is a strong cross-swell between the reef and the shore during storms from the north. The swells on the east side are not so strong during such storms. After passing Santamukka, always keep in the middle of the bay as far as its head, where the ship can anchor in depths of eight to 10

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meters. The bottom is sand and clay. The head of the bay is the most sheltered anchorage in violent north winds, because the force of the swells is broken between the isle in Santamukka and the coast rock, or when they reach the bay. Vessels can also anchor along Santamukka, but this place is less sheltered due to swells from the sea. Because of the rock bottom, vessels are also in danger of being driven on them by storms.

Lead mines formerly existed on the shore of the bay, but they are not operated now. The shore is uninhabited.

6. Peuravuono Peuravuono penetrates inland as a sound about two nautical miles southward between steep high elevations. From seaward it resembles a steep gorge. Its entrance can be easily distinguished from the surrounding terrain. The entrance to the bay is rocky and low. It has a depth of less than one meter at low tide at its narrowest part. When a strong current enters the bay during the tides, small vessels seldom come into the bay. The depths inside this bay are regular near the shore (40 to 45 meters). The head of the bay has areas which dry during long low water periods. The depth in front of the entrance is less than 10 meters in a large area which can sometimes be used as an anchorage. Off Edward Laassa is an anchorage well sheltered against west winds. It has depths of four to five meters and can be approached from the north.

The shores on both sides of the bay are covered with grass and low capes, the rocky extremities of which dry for long distances. There is an extensive level area on the east side of the bay with the only structure on this bay. It is painted gray and cannot be seen far out to sea. Both shores of the bay are high and steep. The west shore is steeper than the east shore. At its head a valley extends far inland in the same direction as the bay. A path along the valley leads to Liinahamari.

A lead mine was formerly located on the west shore of the bay, but is not operated now. There are no other buildings on the bay except the structure mentioned above.

7. Nurmensatti The peninsula of Nurmensatti is situated about four nautical miles southeast of Peuravuono and one and one-half nautical miles west of Pechenga Gulf. It projects from the shore for a distance of 800 meters and is 1700 meters long in a northwest-southeast direction. Most of the peninsula is less than 25 meters high. Its maximum height is reached on the east side (45 meters). The north shore is steep and grey in color; its south shore slopes and is partly covered with sand.

An extensive area with depths of 25 to 35 meters extends about one nautical mile northeast of the peninsula. The bottom is rock. Ships can anchor here in case of emergency.

Two submerged rocks, drying at low tide, stand at a distance of 50 meters apart about 250 meters from the middle

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of the peninsula and north of the small islet. Both rocks are very steep, and there is a depth of 10 meters only 10 meters away.

The peninsula is connected with the mainland by a low narrow isthmus. The Bay of Pohjoismukka or West Nurmensatti is on one side of the isthmus, and Etelämukka or East Nurmensatti on the other.

a. Pohjoismukka Pohjoismukka is about 800 meters long and 300 meters wide in a southeast direction. The depths at the entrance to the bay are seven to nine meters between Jämsiluoto on the west and northwest extremities of the peninsula. An area about 150 meters wide with depths of 10 to 16 meters extends toward the head of the bay. This area extends along the middle of the bay, but the depths decrease abruptly toward the shores. In front of the entrance to the bay, about 200 meters north of Jämsiluoto and about 400 meters west of the peninsula, is a submerged rock with a depth of 0.8 meters. Pohjoismukka is reached by approaching close to the rocky extremity of Nurmensatti, by which the submerged rock can be cleared. Then sail to the middle of the bay and anchor at least 100 meters from its head. The bay is sheltered against all winds, and the bottom is clay.

b. Etelämukka Etelämukka is employed mostly as an anchorage for small ships. It is about 650 meters long and 320 meters wide. The depth at its entrance is 15 meters, but decreases abruptly and is only seven to nine meters at the entrance to Romanov Bay, a small inlet extending southward. The head of the bay has depths of two to four meters with a sand bottom. Submerged reefs extend across the middle of the bay west of the bluff off Romanovimukka. The nearest reef is 120 meters north of this bluff. Depths of four to five meters occur in the narrow channel between the bluff and the reefs.

Vessels may enter as far as the middle of the bay. After clearing the drying east extremity of Romanov Bay, turn toward its steep west extremity and move about 50 meters shoreward. The submerged reefs can be easily cleared by keeping to the river, which discharges into the south side of the bay. Then turn north for a short distance. Cast anchor off the south shore in depths of three to four meters. There are three piers at the head of the bay for small ships, but they can be reached only at high tide. The bay can accommodate five small sailing vessels. The bottom is a thin layer of sand.

The anchorage is sheltered against all winds, but northeast winds bring swells into the bay. Strong southwest squalls blow from the ravine. Northwest winds blow across the isthmus. Drinking water can be procured from a small stream. The bay is not suitable for wintering because of ice drifts due to the winds.

At high water turn toward the south shore in the entrance and at low water, toward the north shore.

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The peninsula is easily distinguished from the sea at a distance of about five miles because of the low, dark shore and the proximity of Pechemga Gulf.

c. Settlements Many turf houses stand on the south side of Nurmensätti. In the summer they are occupied by fishermen who come there from the village of Petsamo. These houses are not used in winter. Between Nurmensätti and the mainland the isthmus has codfish drying plants. A path leads from Nurmensätti to Liinahamari. The distance is about six kilometers.

8. Petsamo (Pechenga) Gulf This gulf extends inland about nine miles and has four parts or reaches. The first part is about three and one-half miles long and three-fourths mile wide and extends south-southwest. This part of the bay always resembles a closed funnel when seen from the entrance, because its next part turns abruptly westward.

The west cape at the entrance to the gulf is high, steep and dark; the east cape, Numeroniemi, is lower and lighter in color. Both capes are barren except for the moss which covers the granitic rocks in places. A small rocky island, eight meters high, called Numerolaassa, is situated 400 meters north of Numeroniemi. A submerged rock which dries at low water is located 180 meters north of this cape. A shoal with a depth of 2.3 meters lies 100 meters from this rock, bearing 73°. The passage between the small submerged rock and Numerolaassa is 200 meters wide and has depths of 6.5 to 12 meters at its center. Ships can easily navigate this passage, bearing 60° to 240°. The small submerged rocks 40 meters south of Numerolaassa should be given a wide berth. About 700 meters north of Numerolaassa is a small shoal with a depth of 3.2 meters. It has a mark pointing south.

Both shores inside the entrance are elevated, steep and barren. Only stunted birch and ash trees grow at the mouths of the rivers. There are depths of 100 to 160 meters in the middle of the bay. These depths are still 20 to 50 meters about 100 meters offshore. The only island in this part of the bay is the small, low Rikulaassa about 280 meters from the west shore and 800 meters north of Neitiniemi. Other drying rocks, the outermost of which lie 220 meters offshore, stand near the south shore.

The second part of the gulf turns abruptly westward and forms the Bay of Liinahamari (Devkin Cove), which is about two kilometers long and one kilometer wide. There are depths of 80 to 100 meters at the middle of the cove. The same depths occur along the shores, except in the northwest part of the cove where there is an anchorage 350 meters offshore with depths of 20 to 35 meters, sand and clay bottom. There are two piers; one is a Government pier and the other belongs to the Petsamo Fishing Co. Liinahamari is the most important port in the Petsamo area. The harbor is clear of ice throughout the year.

Many birch trees grow at the head of this cove, but the high elevations are barren.

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The third part of the gulf extends southward. It is about one mile long. About 350 meters from the entrance and the other parts of the gulf there is a uniform width of 700 meters. The depths in the middle of this part of the gulf vary between 13 and 60 meters. The water is clear as far as the shores, except for a submerged rock with a depth of 0.2 meters located southward, 400 meters east-southeast of Pak-suniemi at the place where vessels turn into the next part of the gulf. This rock is therefore very close to the middle of the bay. It has a mark point east. Many mountain birch trees grow on the shores.

The fourth part of the gulf extends about four miles south-southeast and is from 500 to 2000 meters wide. It has depths of 35 to 70 meters as far as the village of Trifona, after which they decrease abruptly to between 15 and 18 meters, terminating in the drying bar of the Petsamo River. The north shores are still very high, but become lower toward the head. All elevations are covered with mountain birch. Good anchorages can be found fronting Trifona, which has a Government pier.

Petsamo River, which rises about 100 kilometers from the coast near Inari Järvel, discharges into the head of the gulf. It is 400 meters wide at its mouth as far as the village of Parkkina (Barkino), but most of it dries at low tide. The channel in this river changes constantly, and motor boats should not be operated there without an accurate knowledge of the location of the bars. In June the depths in the middle of the channel are 0.2 to 0.6 meters at low tide.

a. Tides Flood tides enter the bay from the north-west and flow along the shore. Their velocity at the entrance to the gulf is 1 1/2 knots and two knots in the narrow strait off Veneniemi. Ebb tides set in the opposite direction, but their velocity is about 1/2 knot greater.

b. Ice From December to February the south part of the Gulf is covered with ice 60 centimeters thick, from the Bay of Liinahamari to its head. Part of the ice melts in the gulf in spring and part of it drifts out to sea with the north-going current. The Bay of Liinahamari and the water area northward are always clear of ice.

c. Directions for approaching Petsamo Gulf The entrance to Petsamo Gulf can be seen far out to sea between high elevations. Steer directly for the entrance from the sea. On approaching close to it, beware of the 3.2 meter shoal on its east side which has a mark pointing south. In foggy weather it is advisable to use the lead on approaching the gulf. No fog signals are given.

When the gulf is reached, steer to the middle of it, clear Neitiniemi and turn into the Bay of Liinahamari, where the ship may anchor or moor at the pier. A government pier stands in the middle of the west shore. The customs office and warehouse and the harbor office are near the pier. After the ship is inside the gulf, it is best to keep near its

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south side and moor on the port side of the pier. This pier is 46 meters long, and the maximum depth alongside is 6.3 meters. Large ships can moor at the pier, which has rings for mooring cables on both sides. In strong northwest winds there is a heavy swell at the pier, and it is very difficult for vessels to remain there. In such cases the ship can be secured to the buoys standing on both sides of the pier about 180 meters distant. These buoys are not lighted at night. The pier of the Petsamo Fishing Co is situated at the northwest bend of the Bay of Liinahamari near the fish flour mill. This pier is 50 meters wide, and the depth alongside is six meters. Swells are not so strong here as at the government pier.

Ships can anchor in the northwest part of the gulf, clay bottom, in depths of 20 to 35 meters. The anchorage is about 350 meters from the shore. Its outer limit is the most northerly mooring buoy at the government pier as far as the east side of the fish flour mill. The depth increases abruptly to 80 meters outside of this area. Swells are felt at this anchorage, but, if the bottom is suitable, it is safe against strong winds.

When moving farther into the gulf, keep in the middle of the narrow strait, which has a depth of 13 meters. Paksuniemi on the south side of the strait should be doubled at a distance of about 100 to 200 meters in order to clear the shoal with a depth of 0.2 meters (located 400 meters east of this cape). The village of Parkkina can be seen immediately after this cape is doubled. The village is situated at the head of the gulf. The church tower is plainly visible. Steer to the middle of the gulf on sighting the houses of the village of Vuonokyla on the west side. The village of Trifona can be seen behind the hills and the trees. The best anchorage is in front of Trifona, sand and clay bottom. The bottom is uniform, and the depths are 15 to 35 meters. Ships should not anchor too far southward, in order to clear the drying sand bar at the Petsamo kiver. This anchorage is sheltered against all winds, and swells are not felt here.

d. Directions for entering the gulf at night (See Finnish List of Lights) When a ship is in the white sector of Numeroniemi Light, steer toward this light until about one mile distant, then turn to the middle of the gulf. Heinasaari and Valashiemi Lights are useful landmarks for taking bearings in this area. If the weather is too foggy to sight the shore, move close to Numeroniemi Light and turn; then cross the green and red sectors until the ship is inside the white sector of this light and keep in this sector until she is in the white sector of Ristiniemi Light; thence, keep in this sector in the direction of the light until Neitiniemi is doubled by turning toward the harbor or anchorage. It is reached by approaching it in the middle of the white sector of Ristiniemi Light.

e. Liinahamari This is the most important harbor in the Petsamo area. About ten small and three large ships can anchor in this harbor. It is always clear of ice. Water can be procured at the Government pier. It has a 1/2 ton crane and

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a harbor office. A weather observatory stands on the slope of a mountain near the pier. Smaller ships shape a course to the Bay of Liinahamari. The harbor has a customhouse, post office, airport, hotel and passenger service to the fishing stations and Kirkkonieni. It is a terminal on the highway to the Arctic Ocean and has motor car connection with Nevanieni. The trip of 531 kilometers can be completed in 15 hours. The harbor has a cooperative store with a large stock. It also has an oil storage, the pier of the Petsamo Fishing Co., a coal warehouse (about 400 tons), a fish flour mill, a dock at least 15 meters long for large ships, a repair dock and a radio station.

f. Trifona This harbor is sheltered and can accommodate many ships. It has a Government pier, a post office, airport, a forestry service station, cooperative and private stores, a brickyard and national schools. A highway extends from Trifona to Liinahamari, eight kilometers distant.

g. Parkkina (Barkino) Parkkina is a church town with Luthern and Greek Catholic Churches. It is the financial and business center of the Petsamo area. It has a bank, post office, airport, police station, border patrol station, a doctor, hospital and drug store. It also has a cooperative store, bakery, private stores, an oil storage, national schools and a hotel. A highway connects Parkkina with Trifona and Liinahamari which are, respectively, eight and 15 kilometers from Parkkina.

The villages of Vuonokyla, Parovaara, Näsyykä and Kaakuri also stand on the shores of Petsamo Gulf. But they are small unimportant settlements, and their inhabitants are engaged in fishing and stock-raising.

9. Pikku Maattivuono Pikku Maattivuono is situated on the west side of Petsamo Gulf. It is about 1 1/2 miles long in a south-southeast direction. Its average width is 600 meters. A small islet, eight meters high, called Numerolaassa is situated west of the entrance to this bay about 400 meters north of Numeronieni. A submerged rock, drying at low tide, lies 180 meters north of Numeronieni. The south mark located about 700 meters north of Numerolaassa can be cleared by at least 200 meters by keeping on the east side. The depth at the entrance to this bay is 100 meters, which gradually decreases toward its head. A depth of only 60 meters occurs at a distance of 400 meters from the head of the bay. The shores of the bay are elevated and steep; the water is free of dangers; and the bottom is rock. The bay is always exposed to northwest and north-northwest winds and is not a good anchorage for small ships. The only sheltered anchorage is Paitahamina, located on the west shore about 1/2 mile from the entrance to the bay. This anchorage is about 300 meters long and 2000 meters wide. At the head is a pier of the Petsamo Fishing Co. North winds bring swells into the bay. Paitahamina has the most important codfish-drying plant for fishermen in this area.

The south part of Pikku Maattivuono is connected to Linjalampi and Sisäjärvä by a narrow strait. This strait has a rapid waterfall at the place where the water flows toward Linjalampi at high tide and into the bay at low tide. Row boats cannot navigate this strait because of the fall, except at the slacks. Drying

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rocks are located 400 meters north of the strait, near the east side of the bay.

10. Tuulivuono Tuulivuono Bay is situated due east of Maattivuono. It extends southward for 1200 meters and has a width of 300 meters. Submerged drying reefs lie in the middle of the bay about 600 meters from its entrance. The bay is also exposed to north winds and is used only occasionally as an anchorage for small fishing boats.

11. Maattivuono Maattivuono Bay extends about four miles southeastward. Its entrance is about two miles wide, but narrows constantly until it is only 1/2 mile at the head of the bay. The northern shore is regular and low. Low hills rise from the shore in the form of terraces. The south shore is more elevated and irregular and has many inlets and capes. The bay is open on the northwest side, but it is not a suitable anchorage because of the silt 60 meters from its head.

The south side of the bay is deep. Depths of more than 10 meters occur in many places only 100 meters offshore. The only detached shoal some distance offshore is situated at the head of Funaisen Cove. This shoal has not been closely examined. It has a depth of 4.1 meters and lies 400 meters from the shore. The north shore of the bay is lower. Several shoals lie west of Valasniemi Light: one of them is 250 meters offshore with a depth of 15 meters; another is 350 meters offshore with a depth of less than 10 meters. Two other shoals, with depths of six and ten meters, lie southeast of this light 150 to 250 meters offshore. From this place the coast has a steeper slope. There are two bars about 3/4 mile from the light. One of them, with a depth of six meters, lies in the direction of the village about 400 meters offshore; the other, with a depth of 10 meters, lies 500 meters offshore. The coast near the village and west of the cape becomes steeper, and a depth in excess of 10 meters is found from 100 to 200 meters offshore. A drying shoal lies at the head of the bay 200 meters from the small island off the south shore. Two other drying shoals lie 500 meters from the head of the bay. The water is very shallow beyond these shoals toward the head of the bay (two to five meters deep), and there are many dry patches at low tide. The bottom is sand and gravel, and in some places, only sand.

a. Directions for approaching Maattivuono The entrance to Maattivuono can be sighted far out to sea from the west and northwest. It resembles a low narrow isle surrounded by higher elevations. Southward the shore is high and irregular. On the north side of the bay the shore rises abruptly, forming a ridge of hills, then extends northward and terminates in a flat summit. Steer from the sea directly toward the entrance of the bay. On nearing the entrance, a yellow structure at the head of the bay and Valasniemi Light near the entrance are seen. The light cannot be seen at a distance in the daytime because it is a column light standing on a low cape. On approaching from the north, the light can be cleared by at least 500 meters, and the ship can be steered toward the head of the bay at the same distance from the shore until she can approach land at the village and cast anchor.

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At night ships should enter the bay in the white sector of Valasniemi Light (See Finnish List of Lights).

b. Anchorage Ships can anchor from 300 to 500 meters off the north shore in depths of five to 30 meters. The bottom is clay everywhere. Ships can anchor in front of the village alongside the pier when the nearest cape on the west is in line with Valasniemi Light. The anchorage has a depth of six meters. A depth of four meters still occurs only 100 meters offshore. This anchorage is exposed to west and northwest winds. The south coast is unsuitable as an anchorage, because it is more exposed to winds and has very great depths close to the shore. The only really sheltered anchorage is at Lukkohamina near the head of the bay, where small fishing vessels can anchor. There are mooring rings on the shore. The bottom is mud and clay. The settlement of Lukkohamina has only one building.

The village of Maattivuono is situated in the middle of the north shore of the bay. Its inhabitants are engaged in fishing and stock-raising. The village has a small pier for small fishing vessels. The border patrol station is located near the head of the bay. It has telephone connection with Petsamo and the fishing stations.

12. Heinosaaret (Lincvskie Isles) In clear weather these isles can be seen at a distance of 10 nautical miles. They are covered with low peat and moss. In many places pebbles are found beneath the one-meter layer of turf. The most common plants are berry bushes, but grass and other vegetation also grow in the low places. Cloudberry bushes are plentiful here and along the entire shore. Numerous water fowl, such as puffins, ducks and various kinds of gulls, nest on these isles in summer. These isles are game reservations, and hunting is prohibited.

a. Heinosaari Heinosaari is 2300 meters long from north to south and 1600 meters wide. The highest point, 23 meters, is on the west side where Heinosaari Light is located (see Finnish List of Lights).

The depths along the coast of Heinosaari are great everywhere, and there are no dangers. A depth of more than 10 meters only 200 meters offshore is found in all places. The only exceptions are the water areas off the southeast and northwest extremities of these isles. The southeast extremity dries at low tide for a distance of about 100 meters. A bank with a depth of five meters extends southeast. Depths of more than 10 meters are found 400 meters from the shore. An area with a depth of 10 meters extends from the northwest extremity of the island near the small cove to a distance of 500 meters from the shore. A detached shoal with a depth of 9.1 meters lies about one kilometer northeast of the northeast extremity of the isle. The depths increase abruptly along the south and west coasts. The depths are more than 100 meters everywhere, at a distance of 400 to 700 meters off the south shore and one kilometer from the west shore. The north and east coasts are steeper, and a depth of 50 kilometers occurs only two kilometers offshore and beyond.

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b. Anchorage The bottom is rock everywhere around these isles, except on the south coast where it is sand. This is the best anchorage and is used by most vessels. There are depths of 30 to 40 meters about 200 meters from the shore at a point where the light is due north or a little east of north. This part of the coast has a small wooden pier for the use of rowboats. Ships leaving this anchorage to pass between the Heinäsaari Isles should be kept at least 300 meters off the south shore. The southeast extremity of the isle is easily cleared when the northern extremity of Pieni Heinäsaari (Little Ainevskiä Isle) is kept in line with the northern extremity of Pummanginiemi; thence the ship can pass between the isles by keeping in the middle of the strait.

Ships can also anchor along the other coasts of these isles when the wind is favorable. There are depths of 10 to 15 meters along the east and north coast, and 20 to 30 meters along the west coast. In a strong wind there are swells around the isles, but ships can anchor close to the shore in all places where they will be sheltered against storms.

c. Pieni Heinäsaari Pieni Heinäsaari is 1300 meters long from north to south. Its width is 900 meters. The highest point of this isle is on its south side. It has a mark to guide mariners. A low sandy peninsula begins south of this high point. A shoal with a depth of less than 10 meters lies 400 meters from the northwest, west and south shores. But the east shore is steep, and the depths of over 10 meters are found at least 150 meters offshore. Pieni Heinäsaari is not sheltered against the swells which are felt everywhere around the isle. The bottom is rock everywhere, and there is no suitable anchorage there for small ships.

13. Pummanginvuono The entrance to Pummanginvuono Bay is about five miles wide. The bay extends seven miles inland in a southeast direction. It terminates inland in two low narrow inlets called Muotkanpera and Haminanpera. Välliniemi, 105 meters high, stands between these inlets. A steep hill on the peninsula, with a triple summit 96 meters high, is the most conspicuous landmark in this area. Low valleys on both sides of Välliniemi extend as far as Muotkanvuono.

The shore on both sides of the bay rises steeply inland in the form of terraces. The slopes of these elevations are covered with peat. The east shore is more elevated. Pummangintunturi (height 201 meters), visible far out to sea, is situated near the entrance. Haminatunturi (height 237 meters) stands near the head of the bay, but is seen only inside of it. The north shore terminates in low Klub Hill, which is clearly seen at sea because of its steepness and conical shape.

The depths at the entrance are 75 to 90 meters. The bottom is very uniform. A depth of 70 meters is still found off Ruumismaa Rock situated in the middle of the bay. The north coast is clear everywhere. The water is deep in the middle of the bay. The north coast is clear everywhere. The water is deep in all places 500 meters from the shore. The south coast at the entrance is also deep and has no

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dangers except a rocky shoal with a depth of 5.8 to 6.3 meters which lies off Ruumismaa Rock about 900 meters off-shore. A mark pointing west stands on the extremity of the shoal. The deep water area then curves for a short distance as far as the village of Pummanki. The depths decrease after leaving this village and are less than 10 meters about one kilometer from the shore. A bar with a depth of one meter lies across the entrance to Paminanpera. Depths of three to four meters are found in the middle of the bay. The coast is low and rocky everywhere, and motor boats can enter only after a close examination of the banks, shoals, etc. Pieni Perahamina, where the natives anchor their fishing vessels in strong northwest winds, is on the west side of the bay. Nuotkanpera is deeper and has fewer dangers, but is not sheltered against northwest winds. A drying reef lies in the middle of the entrance to the bay.

a. Directions for approaching Pummanginiemi  
Pummanginiemi (201 meters) can be seen far out to sea and is a good landmark for entering the bay. Ships coming from the south can double this cape at a distance of 400 meters. Klub Hill can be passed from the north at a distance of 100 meters. Then steer to the north side of the bay until past the west mark of Ruumismaa Rock and turn toward the west mark at Pummanki Village. This village is seen as soon as the ship is near the rocks. The red school house is easily seen. The best landmarks on this bay are Klub Hill, Vmliniemi and Ruumismaa Rock. Pummanginvuono Light is clearly seen in the daytime.

At night ships can enter the bay by keeping in the white sector of Pummanginvuono Light (see Finnish List of Lights).

b. Anchorage Large ships can anchor about 500 meters offshore in an area between the west mark of the Pummanki pier and the place where the school house is due west. The anchorage has depths of 9.5 to 13 meters. The bottom is clay and sand. On anchoring be careful that the vessel is not in a line of the bearing marks south of the west mark on Ruumismaa Rock, because the depths toward the shore decrease abruptly to three and even 1.2 meters. The anchorage is always exposed to northwest winds and swells from the sea.

Small fishing vessels can anchor between the pier and the school house in an area 150 to 250 meters from the shore in depths of 1.5 to three meters. This anchorage is least exposed to swells, but, in strong northwest winds, ships are in danger of being stranded. The best berth is at the breakwater under construction 200 meters north of the pier. When this breakwater has been completed this anchorage will probably be sheltered against northwest winds.

At high tide motor fishing vessels berth at the Pummanki Pier, where they are safest. This pier has a 1/2 ton crane. There are swells at the pier in northwest winds.

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c. Settlements The village of Punnanki is situated on a plain near the Punnanki River. It is surrounded by grassy fields. The inhabitants fish and raise cattle. The codfish drying plant is located near the pier. The village has a post office, a telephone station, a cooperative store, a border patrol station and a national school. A government-owned shipyard is located a short distance from the last building in the village toward the head of the bay. The shipyard has no employees to make repairs, and such work must be performed by ships' crews. A small graving dock adjoins the shipyard.

14. Kervannonlahti The cove on the north shore of Klub Hill is called Kervannonlahti. It has depths of less than 50 meters everywhere. One area has depths of less than 10 meters about one kilometer from the shore. The bay is regular and suitable for anchoring. The bottom is mostly rock. In strong winds ships may be driven against the rocks.

On the seaward side the bay is bound by Lunnisaari and Laassat. These isles can be seen at a distance of three miles from the north and the south, but not very easily from the west. Lunnisaari is 15 meters high, 550 meters long and 400 meters wide. Most of its area is covered with grass, but the coast rocks are barren. The depths along the west and south sides of Lunnisaari are great up to the shores. The north and east coasts slope more gently. A shoal with a depth of less than 10 meters lies about 300 meters northeast of the isle. Southeast of Lunnisaari is a drying reef, and an east mark stands about 140 meters from its west side in a depth of 19 meters. This reef is steep in all directions.

The laassas are a group of very low rocky isles about one mile northwest of Lunnisaari. The most northerly laassa is the largest in size. It is about seven meters high. The others are very low. At low tide the shore of the laassas dries for 50 meters. Strong swells are felt around them in stormy weather and during the slack. A shoal with a depth of one meter lies 100 meters east of the extremity of Lunnisaari Isle. The depths increase abruptly to more than 10 meters only 300 meters from the isles. A west mark stands at the extremity of the shoal in a depth of 15 meters. A bank with a depth of two meters lies opposite the northwest extremity of the last isle at a distance of about 200 meters northwest. A detached shoal with a depth of five meters, of which little is known lies in this same direction 500 meters from the bank. The depth then increases abruptly to over 20 meters. The coast is clear and steep south of this group of isles.

The depths fluctuate widely in the strait between the mainland and the laassas. A bar with a depth of less than 10 meters extends shoreward 500 meters from these isles. Another bar with a depth of 10 meters lies 700 meters from the shore in the direction of the laassas. A detached shoal with a depth of 4.9 meters and having an east mark lies off the extremity of the latter bar 700 meters from Pitkaniemi, bearing 250°. This shoal has not been closely examined. Another detached, unexamined shoal with a depth of 5.3

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meters lies 700 meters from Pitkaniemi, bearing 220°. Swells are felt at these shoals in strong northwest winds. Between the shoals off the mainland and the laassas is an area 200 meters wide with depths of 11 to 12 meters. This area bears 137° from the marks standing in the center of the shore of Santamukka. These marks are very unreliable, because they stand too close to one another. However, it is important to keep to this line as closely as possible. Small fishing vessels can move at least 150 meters from Pitkaniemi, because the depths there are 5.5 to six meters.

The best entrance to the bay is the strait between Lunnisaari and the laassas where there are depths of 25 to 30 meters. If the vessel is approaching from the north, turn at least 600 meters from the northwest side and 200 meters from the southwest side of the laassas. The strait can be safely navigated, because the shoal near the laassas has a west mark, and the depths off Lunnisaari are great.

Vessels arriving from the south can also anchor on the west side of Lunnisaari. The channel is also safe, because the reef along its side has an east mark.

At night the bay can be entered in the light sectors of Kervanto Light (see Finnish List of Lights). Each of the three channels lies in a sector of this light. The most northern sector is narrow and lies between shoals with depths of 4.9 to 5.0 meters. Another shoal lies on the north side with a depth of 5.3 meters. After the latter shoal has been passed and the southeast extremity of the laassas is due east, the vessel should leave this sector, bearing 130°. This course should be kept until the vessel is in the white sector of Kervanto Light. Then turn toward the anchorage which lies between directions 55° and 60°. Although the northern sector is narrow and shoaly, it is of some importance, especially to small ships arriving from the north which cannot safely navigate the unlighted west side of the laassas at night. But large ships can get their bearings by means of Kervanto and Heinisaari Lights and enter Kervanto Bay in the middle of the white sector of Kervanto Light, which is wide and sheltered. Ships arriving from the south should be steered into the white sector on the east side. This area is narrow, but can be safely entered because of its great distance east of the laassas and Lunnisaari. This area is also close to an anchorage.

a. Anchorage The depths at the head of Kervanto Bay are everywhere uniformly less than 10 meters. A bank with a depth of 2.5 meters lies at the mouth of the Kervanto River about 700 meters from the north extremity of Lunnisaari. The best anchorage is west of this bank midway between Kervanto Light and Kervanto River at the entrance to the small inlet. On leaving this anchorage, the bank can be cleared on the east side by keeping in the line formed by the east extremity of Lunnisaari and the summit (201 meters) of Puumangintunturi. Uniform depths of four to five meters occur here only 200 meters from the shore. Since the bottom is regular, small ships can also anchor near this bank.

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This anchorage is sheltered against north and east winds, but is exposed to west and south winds. The bottom is mostly rock.

b. Settlements The village of Kervanto is situated west of the mouth of the Kervanto River. Its inhabitants are engaged in fishing and cattle raising. There is a small boat pier west of the village at the entrance to the bay. All of the pier dries at low tide. A road five kilometers long extends from the village to Vaida Bay. Kervanto has a store and telephone connection.

15. Vaihtolahti Vaida Bay, called Vaihtolahti by the Finns, is located on the Finnish-Russian border between Majakkaniemi and Ostaniemi. This border extends from the middle of the bay toward the south side of Navalokinniemi, located on the east shore and thence southward. All of the head of the bay except its east shore, therefore, lies on Finnish soil. According to an agreement with the Russians the entire area of this bay is a harbor, and ships can use any side which is suitable. But landings on the other side are prohibited. At the head of the bay near the border patrol station are three bearing marks. The line formed by these marks delimits the so-called police district in this bay. These limits extend to about 50 meters from the Finnish border.

The bay is one mile wide at its entrance and extends inland for about 1 1/2 miles in a southwesterly direction. A group of small low islets extends across the bay directly from the center of its west side toward the east coast of Navalokinniemi. The part of the bay beyond these islets is very shallow and has many dry patches at low tide. But this is the only part of the bay which is, to some degree, sheltered against winds and swells. It is, therefore, used as an anchorage by small fishing vessels. The bottom is sand everywhere at the head of the bay. The south side of the bay north of these islets has uniform depths of 7.5 to nine meters in an extensive area. An area with depths of only 10 to 11 meters and a width of 150 meters extends from the middle of the bay toward Ristilaassa, the largest isle on the west side. A rocky shoal, of which little is known, with a depth of 4.1 meters lies about 600 meters from the entrance to the bay and 500 meters from the west shore. An east mark stands off its east extremity in a depth of 10 meters. A bank with a west mark at a depth of 13 meters lies 300 meters from Västaniemi, the entrance point on the west shore of the bay.

A shoal lies 500 meters from the west shore opposite the most northerly west mark off the cape. This shoal has depths of 7 to 8 meters at its extremity, but they decrease shoreward, up to a reef with a depth of 0.9 meters, a distance of 250 meters from the shore. The range lights for entering Vaida Bay are only about 50 meters from the extremity of this shoal, which is not marked. The depth in the middle of the entrance to the bay is 20 meters.

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The west and south shores of the bay are very low, but the east shore is slightly more elevated. Ost#aniemi, its most northern point, is easily recognized from a long distance because it is high and conical.

a. Majakkanieni Light Majakkanieni, at the north-west extremity of the fishing stations, has a yellow structure with an octangular roof supporting a white light tower. In daylight this light is clearly seen from the west and the east at a distance of about five miles. It is not easy to see this structure from the north because of the nature of the terrain. On the east side it is hidden from view by Est#aniemi.

A low cape is located north of this light about 200 meters from the shore. This part of the bay also has many islets. A detached shoal, which has not been examined, with a depth of 9.6 meters lies 250 meters northwest of the outermost point of this cape. Otherwise the north coast is clear of reefs and shoals.

b. Range lights in Vaida Bay The outermost light in Vaida Bay stands on Ristilaassa. It is a small white structure supporting a light tower. The innermost light is on a shed on the government pier. The light is in the shape of a white square with a black diamond below it. The lights are in a line bearing  $233^{\circ}$  (see Finnish List of Lights).

c. Piers Two small piers for small fishing craft are situated on the west shore of Vaida Bay. Both piers dry at low tide, but fishing vessels can moor there at high tide. Strong swells are felt at the piers in north winds.

d. Anchorage Vaida Bay has no sheltered anchorage for larger vessels because it is exposed to north and north-east winds. The bottom is rock everywhere, and the anchor will not hold in strong winds. In case of emergency, ships can be anchored inside the bay at least 400 meters from Ristilaassa and 400 meters south of the most southerly west mark. The pier on the north will then be due west. The depth in the anchorage is 10 meters. Depths of more than 7 meters occur within a radius of 200 meters on each side.

Small fishing vessels cross the strait west of Ristilaassa and anchor due west of its entrance in depths of two to four meters. The west shore should not be approached too closely because of a drying shoal 100 meters from the west shore of the small cape. Vessels should not be anchored near Ristilaassa because of the drying point 350 meters southwest of this isle.

Another anchorage for small vessels is located east of Ristilaassa at the entrance to the strait between this islet and V#lilaassa on the east. It has depths of 1.2 to 1.8 meters. This anchorage is entered on the east side between V#lilaassa and Navalokinlaassa through the strait. Turn on the starboard side to clear V#lilaassa and a drying shoal 120 meters south of that islet. The depth in the middle of the strait between the islet and the shoal is 1.2 meters.

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In other places the depth of the entering bay is less than one meter at low tide. By carefully sounding the banks, vessels can enter the bay at mean and high water levels, because the bottom is uniform and sand everywhere.

e. Directions for approaching Vaida Bay If approaching from the west, turn north when at least 300 meters from the extremity of Majakkaniemi and then sail east toward the shore, keeping the same distance. After the entrance is reached and the most northerly west mark has been passed, turn south and make for the Vaida Bay range lights. Ships can be anchored in a depth of 10 meters, rock bottom, midway between the west mark and Ristilaassa. Small craft with a draft of less than two meters can proceed to the inner anchorage keeping in the middle of the strait west of Ristilaassa, where there are depths of three to four meters. The vessel must then turn west of the range lights and enter the strait in the same direction because of the drying bank 100 meters north of Ristilaassa.

When the vessel approaches from the north, the prominent extremity of Ostaniemi on the east shore of the bay and Kelloviidentunturi two miles south of Vaida Bay Light can be seen from a great distance. The entrance to the bay is easily recognized by means of these landmarks. By day the light cannot be seen from the north except when very close.

f. Magnetic variations Magnetic variations have been observed along the entire coast east of Majakkaniemi. Great caution is therefore recommended near the coast during fogs.

g. Tidal currents The flood tide along the north-west coast of the fishing stations begins 1/2 hour after the moon crosses the meridian. It first sets south-southeast and later southeast along the coast at a velocity of 1 1/2 knots. Farther from the coast the tides set in the same direction but are perceptibly weaker. The ebb tide begins seven hours after the moon crosses the meridian and sets north-northwest and northwest.

h. Settlements The village of Vaintolahti (Vaida Bay) is located on the west and south shores of the bay. It has telephone connection with Liinahamar (Devkin Cove), a post office, border patrol station, cooperative store, hotel and a school. Its inhabitants are engaged in fishing and cattle raising.

#### Vaida Bay

Unpainted log structures are used as marks.

Kelloviisi, the same as Väsätaniemi, except that it has a pole with a black ball (diameter 1.5 meters) on top.

Boundary marks:

Above, same as Koskimäen, height 3 meters, sides 4 meters.  
Below, same as Kaskimäen, height 4 meters, sides 5 meters.

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## GLOSSARY

Etola	South
Kyla	Village
Laassa	Low isle
Lahti	Gulf, bay, cove
Majakka	Lighthouse
Mukka	Isle
Nieni	Cape
Ost	East
Pieni	Little
Pikku	Little
Pohjois	North
Risti	Cross
Saari	Island, isle
Tunturi	Barren Arctic hill or mountain
Valas	Whale
Väst	West
Vuono	Gulf, bay

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